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## **Water Heating: Hourly Water Heating Model for TDV Analysis**

### **Description**

Current water heating algorithms calculate water heating budgets based on annual calculations. To effectively use TDV, algorithms must be developed which accurately convert the annual calculations to an hourly basis. This proposal should not have any affect on the balance between standard and proposed DHW budgets, only on the tabulation of energy use by hour. This change would affect all building types covered by the residential *Standards*.

### **Benefits**

Since natural gas (or propane) water heaters are installed in virtually all new California construction, the state-wide impact of TDV on water heating will be most significant for continuous recirculating systems .

### **Environmental Impact**

The primary impact is expected to be due to savings associated with continuous recirculating systems. ,

### **Type of Change**

The proposed changes will affect the modeling assumptions for both standard and proposed buildings. The changes would affect the ACM, but would likely not affect other compliance documents, manuals, or analysis tool documentation.

### **Measure Availability and Cost**

N/A.

### **Useful Life, Persistence and Maintenance**

N/A.

### **Performance Verification**

N/A.

### **Cost Effectiveness**

N/A.

### **Analysis Tools**

The existing water heating methodology will be the starting point for evaluation of TDV impacts. The algorithms will be reviewed to determine the necessary modifications to complete hourly calculations. Annual energy use under the existing method and the TDV method would be compared to ensure consistency.

### **Relationship to Other Measures**

There are likely to be interactions between this measure and other proposed water heating measures.

### **Bibliography and Other Research**

The following data is available and will be reviewed in the course of this work:

Davis Energy Group. *California Residential Water Heating Standards – Volumes I – III, 1991*. These volumes represent the technical basis for the existing water heating standards.

USDOE Technical support document on water heating.

TDV studies completed for PG&E by Eley Associates.

Experts to be contacted include:

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